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The link between Rejection Sensitivity and Borderline Personality Disorder: A systematic review and meta-analysis

Supplementary Materials

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Appendix 1: Details of adapted Quality Assessment

The Newcastle-Ottawa Quality Assessment Scale for case control (Wells et al., 2000) and cross-sectional studies (Herzog et al., 2013) were adapted for this study by removing the criterion regarding non-responders, and incorporating a two-point response for an item regarding statistical analysis (whereby an additional point is given if confidence intervals are included). The case control measure was also adapted to assess ascertainment of outcome rather than exposure, given the similarities between definition of cases and exposure.

Appendix 2: Tables summarising quality assessment for Question 1

Table 1. *Table summarising quality assessment for included studies in Question 1*

Paper	Selection					Comparability of cases (max 2 points)						Outcome	
	N	Quality Score	Representativeness of cohort	Justified sample size	Validated ascertainment of exposure (max score 2)	Score	Age	Gender	Ethnicity	Education	Other	Ascertainment of outcome	Statistical test (max score 2)
Bungert, Liebke et al (2015)	167	6	0	0	2 (BSL/CTQ)	2	1		1			1 (SR)	1
Chesin et al (2015)	60	6	0	0	2 (CTQ ^a)	2		1			1	1 (SR)	1
Erozkan (2015)	882	4	0	0	2 (CTQ)	0						1 (SR)	1
Feldman & Downey (1994)	212	5	0	0	1 (Adapted CTS)	2	1	1				1 (SR)	1
Goodman et al (2014)	133	6	0	0	2(CTQ ^a)	1					1	1 (SR)	2
Hernandez et al (2016)	185	6	0	0	2 (CTQ)	1		1				1 (SR)	2
Ibrahim et al (2015)	271	6	0	0	2 (PARQ)	2	1	1	1			1 (SR)	1
Kahya (2018)	288	6	0	0	2 (CTQ ^a)	2	1	1		1	1	1 (SR)	1
Masland (2016)	77	5	1	0	2 (SCID-II/CTQ)	0						1 (SR)	1
Pachankis et al (2015)	374	7	1	0	2 (M-F-P)	2	1				1	1 (SR)	1
Pierce et al. (2015)	423	4	0	0	2 (Early trauma inventory SR)	0						1 (SR)	1
Rosenbach & Renneberg (2014)	193	5	0	0	2 (PRSQ)	0		1 ^b				1 (SR)	2

Paper	Selection							Comparability of cases (max 2 points)						Outcome	
	N	Quality Score	Definition rejection accurate?	Representativeness of cases	Selection of controls	Definition of control	Ascertainment of exposure comparable	Score	Age	Gender	Ethnicity	Education	Other	Ascertainment of outcome	Statistical test (max score 2)
Berenson & Anderson (2006)	144	6	0 (adapted CTS)	0	1	1	1	2	1				1	0	1
Schaan & Vogelee (2016)	186	6	0 (yes/no question)	1	1	1	1	0						0	2

Note. SR = Self-report; CTQ = Childhood Trauma Questionnaire; CTS = Conflict Tactics Scale; PARQ = Parental Acceptance-Rejection Questionnaire; SCID-II = Structured Clinical Interview for DSM-IV Axis II; PRSQ = Parental-Representation-Screening-Questionnaire; MFP = Mother-Father-Peer Scale

^a The CTQ was adapted so two subscales were amalgamated. However, this should not affect validation; ^b Statistics showed significant differences in this factor, but no reports of controlling for it.

Appendix 3: Tables summarising quality assessment for Question 2

Table 2. Table summarising quality assessment for cross-sectional studies included in Question 2

Paper			Selection		Comparability of cases (max 2 points)									Outcome	
	N	Quality Score	Definition BPD accurate?	Representativeness of cases	Selection of controls	Definition of control	Ascertainment of exposure comparable	Score	Age	Gender	Ethnicity	Education	Other	Ascertainment of outcome	Statistical test (max score 2)
Beeney et al (2014)	44	5	□□(SCID-II)	0	1 (com.)	1	1	0						0 (SR)	1
Berenson, Dochat et al (2016)	124	8	□□□□□□□□ □□□□□	1	1 (com.)	1	1	2	I	I	I			0 (SR)	1
Berenson et al (2018)	73	6	0 (SNAP)	0	1 (com.)	1	1	2	I	I	I			0 (SR)	1
Bungert, Koppe et al (2015)	40	6	□ (IPDE)	0	1 (com.)	1	0	2	I			I		0 (SR)	1
Bungert, Liebke et al (2015)	152	6	□ (IPDE)	0	1 (com.)	1	0	2	I			I		0 (SR)	1
Chesin et al (2015)	85	5	□□(SCID-II)	0	0 (hosp.)	0	1	2		I			I	0 (SR)	1
Erbe (2014)	29	7	□□(SCID-II)	0	1 (com.)	1	1	2	I		I	I		0 (SR)	1
Fertuck et al (2013)	36	6	□□(SCID-II)	□	1 (com.)	1	0	1 ^a	0 ^a	I	I	I		0 (SR)	1
Gutz et al (2015)	50	7	□□(SCID-II)	0	1 (com.)	1	1	2		I		I		0 (SR)	1
Jobst et al (2016)	39	6	□□(SCID-II)	0	1 (com.)	1	0	2	I	I		I		0 (SR)	1

Liebke et al (2018)	112	6	II) 1 (IPDE)	0	1 (com.)	1	0	2	1	1	0 (SR)	1
Rosenbach & Renneberg (2015)	63	3	□□(SCID-II)	0	1 (com.)	0	0	0			0 (SR)	1
Staebler et al (2011)	102	5	□□(SCID-II)	0	1 (com.)	0	0	2	1	1	0 (SR)	1
Thome et al (2016)	72	7	□□(IPDE)	0	1 (com.)	1	1	2	1	1	0 (SR)	1
Winter et al (2015)	53	6	□□(IPDE)	0	1 (com.)	1	0	2	1	1	0 (SR)	1

Note. SCID-II = Structure Clinical Interview for DSM-IV Axis II; SID-P-IV = Structured Interview for DSM-IV Personality; IPDE = International Personality Disorder Examination; com. = community; hosp. = hospital control

^a Statistics showed significant differences in this factor, but no reports of controlling for it.

Table 3. Table summarising quality assessment for correlational studies included in Question 2

Paper			Selection			Comparability of cases (max 2 points)						Outcome	
	N	Quality score	Representativeness of cohort	Justified sample size	Validated ascertainment of exposure (max score 2)	Score	Age	Gender	Ethnicity	Education	Other	Ascertainment of outcome (max score 2)	Statistical test (max score 2)
Armenti & Babock (2018)	218	6	0	0	2 (PAI-BOR)	2	1	1				1 (SR)	1
Ayduk et al. (2008a)	379	6	0	0	2 (PAI-BOR)	2		1	1			1 (SR)	1
Ayduk et al (2008b)	104	7	1	0	2 (PAI-BOR)	2	1	1			1	1 (SR)	1
Berenson et al. (2009)	87	5	0	0	2 (IPDE-SQ)	1				1		1(SR)	1
Berlingo (2015)	344	4	0	0	2 (PAI-BOR)	0						1 (SR)	1
Boldero et al. (2009)	101	5	0	0	2 (BPQ)	1					1	1 (SR)	1

Boldero et al. (2009b)	131	5	0	0	2 (BPQ)	1				<i>I</i>	1 (SR)	1
Brown (2014)	98	5	0	0	2 (PAI-BOR)	2	<i>I</i>	<i>I</i>	<i>I</i>		1 (SR)	0
De Panfilis et al. (2015a)	596	7	0	0	2 (PAI-BOR)	2	<i>I</i>	<i>I</i>	<i>I</i>		1 (SR)	2
De Panfilis et al. (2015b)	562	8	1	0	2 (PAI-BOR)	2	<i>I</i>	<i>I</i>	<i>I</i>		1 (SR)	2
Gardner et al. (2010)	150	4	0	0	2 (PDQ-4-BPD)	0					1 (SR)	1
Goodman et al. (2014)	133	5	0	0	2 (SCID-II SQ)	0					1 (SR)	2
Lazarus et al. (2016)	127	5	0	0	2 (PAI-BOR)	0					1 (SR)	2
Meyer et al. (2005)	156	5	1	0	2 (SCID-II SQ)	0					1 (SR)	1
Masland (2016)	77	5	1	0	2 (SNAP -2)	0					1 (SR)	1
Miano et al. (2013)	95	5	0	0	2 (SCID-II SQ)	1		<i>I</i>	<i>I^a</i>		1 (SR)	1
Peters et al. (2014)	411	7	0	0	2 (PAI-BOR)	2	<i>I</i>	<i>I</i>	<i>I</i>		1 (SR)	2
Rosenbach & Renneberg (2014)	193	5	0	0	2 (QTF)	0	<i>I^a</i>				1 (SR)	2
Selby et al. (2010)	94	5	0	0	2 (SCID-II)	1		<i>I</i>			1 (SR)	1
Skinner (2014)	147	5	0	0	2 (PAI-BOR)	1		<i>I^a</i>	<i>I</i>		1 (SR)	1
Tragresser et al. (2008)	118	5	0	0	2 (PAI-BOR)	1		<i>I</i>			1 (SR)	1
Zeilinski & Veillieux (2014)	165	5	0	0	2 (MSI-BPD)	0					1 (SR)	2

Note. PAI-BOR = Personality Assessment Inventory-Borderline Features; IPDE-SQ = International Personality Disorder Examination – Screening Questionnaire; BPD-Q = Borderline Personality Disorder Questionnaire; PDQ-4-BPD = Personality Diagnostic Questionnaire-4-Borderline Personality Disorder; SCID – II - SQ = Structured Clinical Interview for DSM-IV II – Screener Questionnaire; QTF = Questionnaire of Thoughts and Feelings; SCID-II = Structured Clinical Interview for DSM-IV Axis II MSI-BPD = McLean Screening Instrument for Borderline Personality Disorder

^a Statistics showed significant differences in this factor, but no reports of controlling for it.

Appendix 4: Demographic information

Table 4. Table describing demographic information and measurement tools used across different populations and study designs

Characteristic	Question 1	Question two				
	Total <i>n</i> = 3620	Total (<i>n</i> = 5886)	BPD groups (<i>n</i> = 538)	Control groups (<i>n</i> = 517)	Clinical control (<i>n</i> = 248)	Community (<i>n</i> = 4589)
Mean age (SD)	25.22 (6.33)	28 (7.17)	28.38 (7.31)	27.41 (7.5)	33.40 (9.22)	22.88 (4.68)
% female	52%	74%	94%	91%	68%	70%
	Q1 Total	Q2 Total	Case control		Cross-sectional	
Country of study						
USA	9	23	6		17	
Germany	3	10	9		1	
Australia	0	2	0		2	
UK	0	2	0		2	
Turkey	2	0	0		0	
Measurement of RS						
RSQ	8	19	5		14	
(Amended RSQ)	3	6	3		3	
ARSQ	2	8	4		4	
(Amended ARSQ)	1	4	3		1	
Main BPD Measure						
SCID I/II	2	8	7		1	
PAI-BOR	0	11	0		11	
IPDE	1	6	6		0	
SCID-II-SQ	1	3	0		3	
BPD-Q	0	2	0		2	
SNAP-2	0	2	1		1	

BSL-23	1	0	0	0
IPDE-SQ	0	1	0	1
SID – P- IV	0	1	1	0
PDQ-4-BPD	0	1	0	1
QTF	1	1	0	1
MSI-BPD	0	1	0	1

Measurement of
childhood rejecting
experience

CTQ	7
CTS	2
PARQ	1
PRSQ	1
MFP	1
Questionnaire of rejection by peers	1
Early Trauma Inventory SR	1

Note. RSQ: Rejection Sensitivity Questionnaire; ARSQ: Adult Rejection Sensitivity Questionnaire; BPD: Borderline Personality Disorder; SCID-I: Structured Clinical Interview for DSM-IV Axis I; SCID-II = Structured Clinical Interview for DSM-IV Axis II; PAI-BOR = Personality Assessment Inventory-Borderline Features; IPDE = International Personality Disorder Examination; SCID – II- SQ = Structure Clinical Interview for DSM-IV II – Screener Questionnaire ; BPD-Q = Borderline Personality Disorder Questionnaire; IPDE-SQ = International Personality Disorder Examination – Screening Questionnaire; BSL-23 = Borderline Symptom List; PDQ-4-BPD = Personality Diagnostic Questionnaire-4-Borderline Personality Disorder; QTF = Questionnaire of Thoughts and Feelings; MSI-BPD = McLean Screening Instrument for Borderline Personality Disorder; SID-P-IV = Structured Interview for DSM-IV Personality; SNAP-2 = Schedule for Non-adaptive and Adaptive Personality -2; CTQ = Childhood Trauma Questionnaire; CTS = Conflict Tactics Scale; PARQ = Parental Acceptance-Rejection Questionnaire; PRSQ = Parental-Representation-Screening-Questionnaire; MFP = Mother-Father-Peer Scale;

Appendix 5: Additional Forest and Funnel Plots

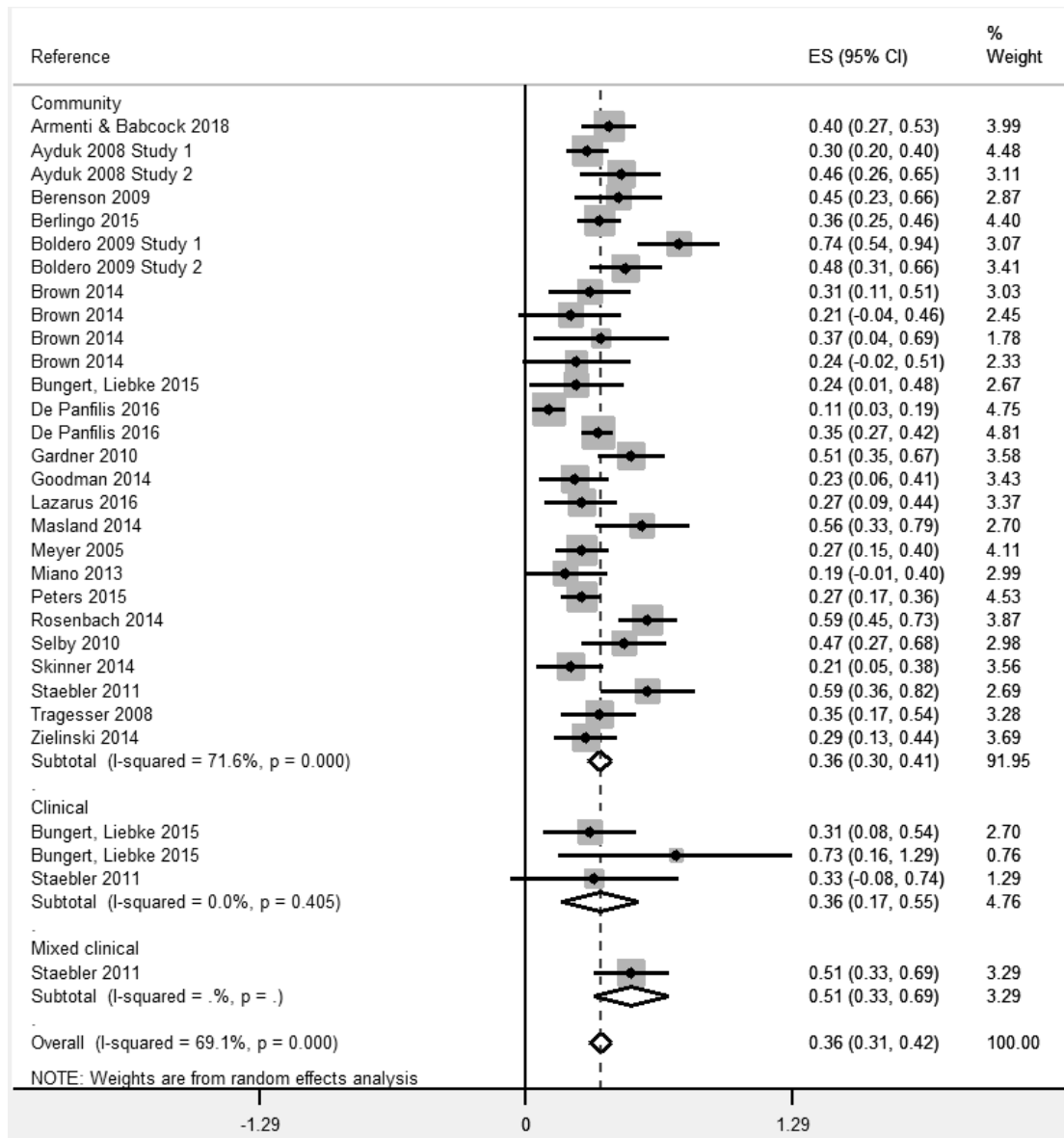


Figure 1. Forest plot for correlational meta-analysis

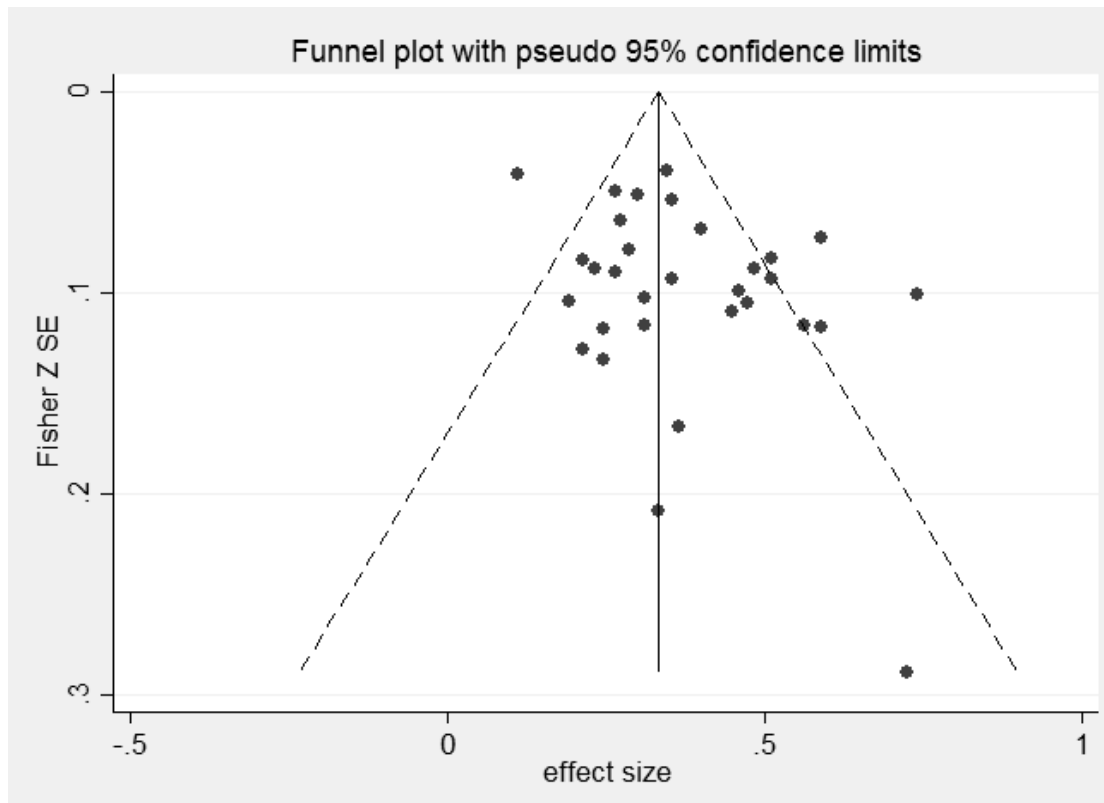


Figure 2. Funnel plot for correlational meta-analysis

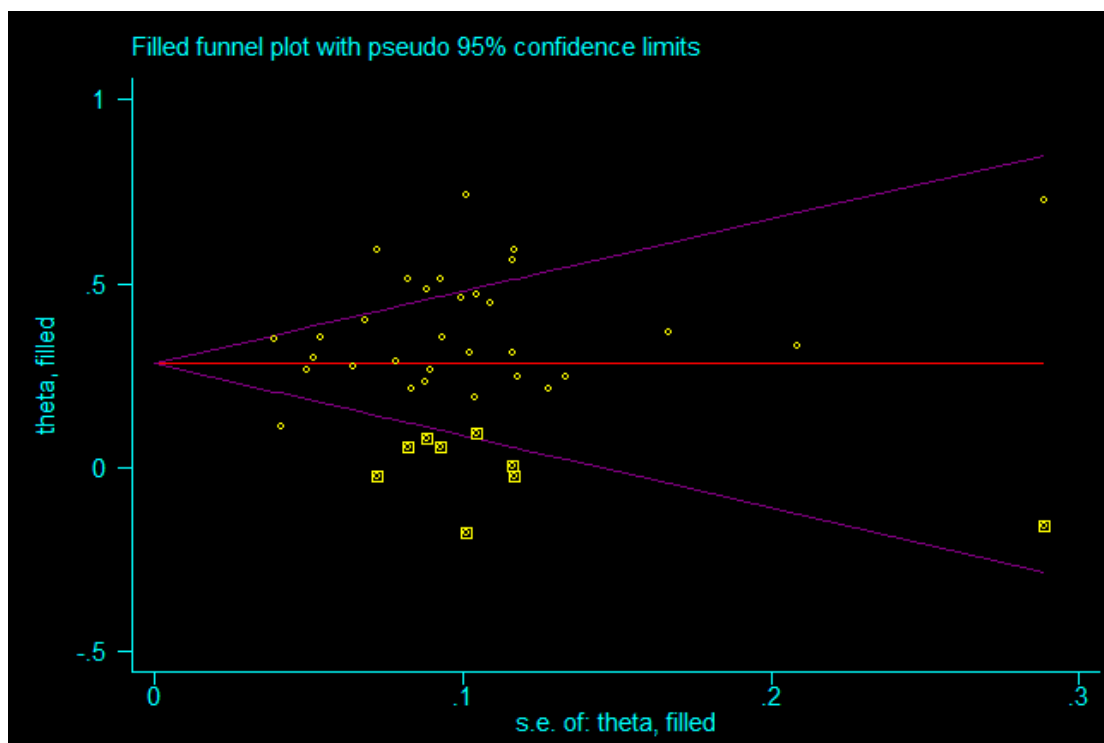


Figure 3. Trim and Fill graph for correlational analysis

Note. Square points represent filled studies

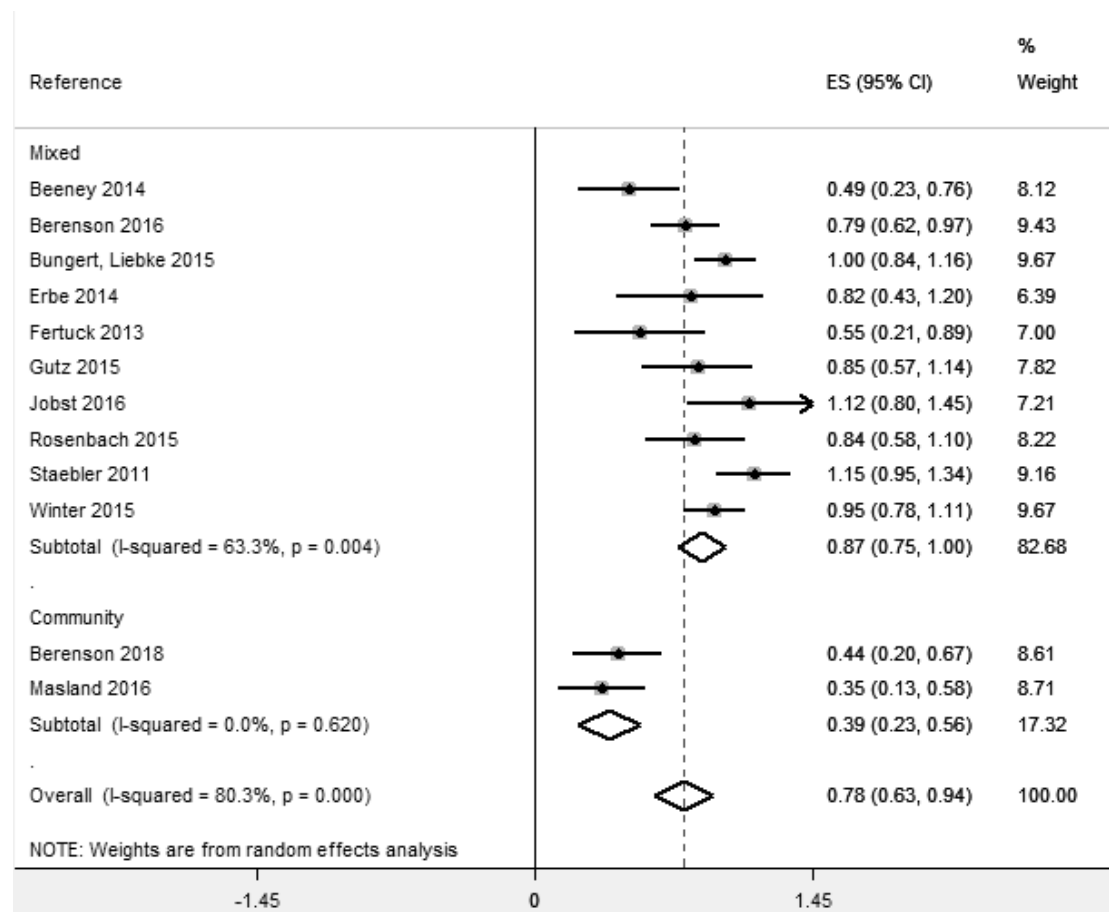


Figure 4. Forest Plot for meta-analysis of case-control studies comparing BPD and Healthy control

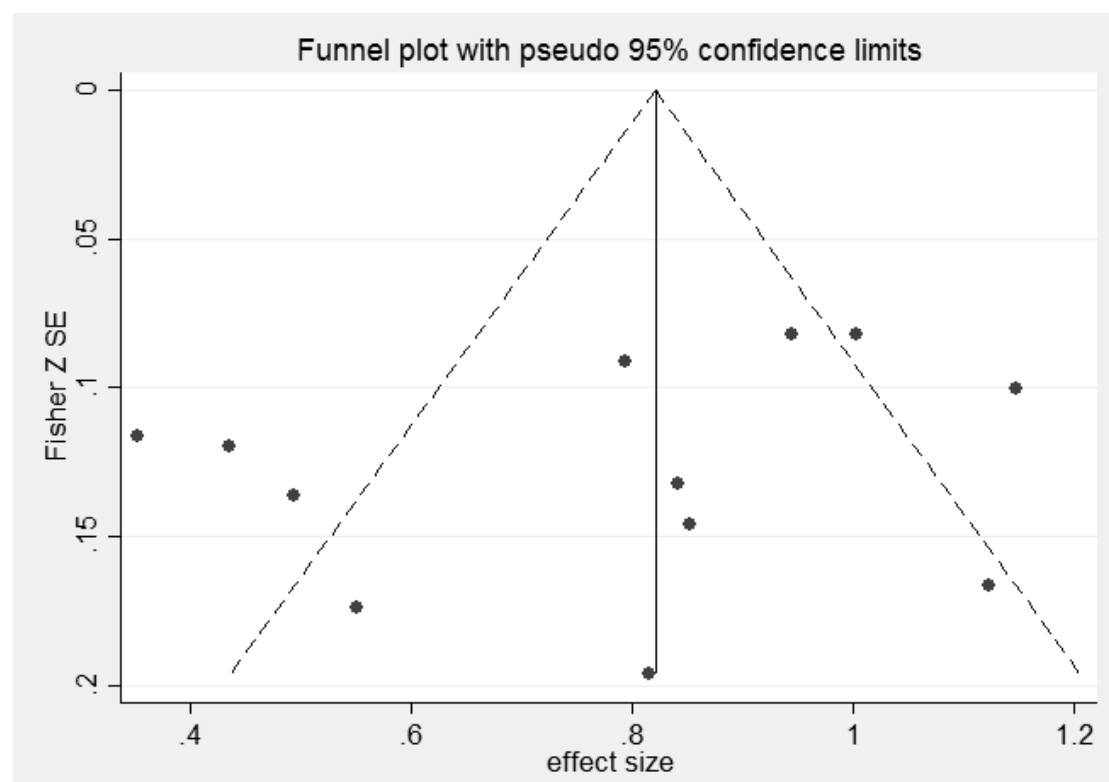


Figure 5. Funnel plot for meta-analysis with case-control studies comparing BPD and healthy control

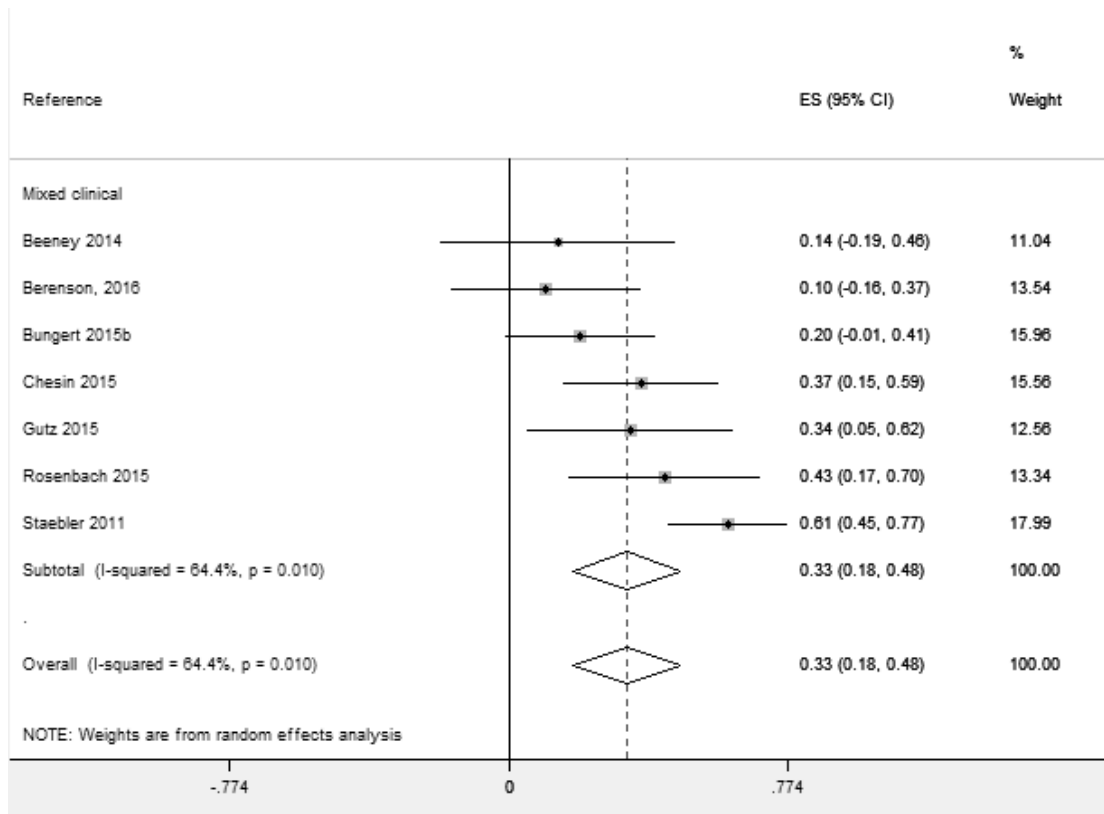


Figure 6. Forest plot for meta-analysis comparing BPD and clinical control

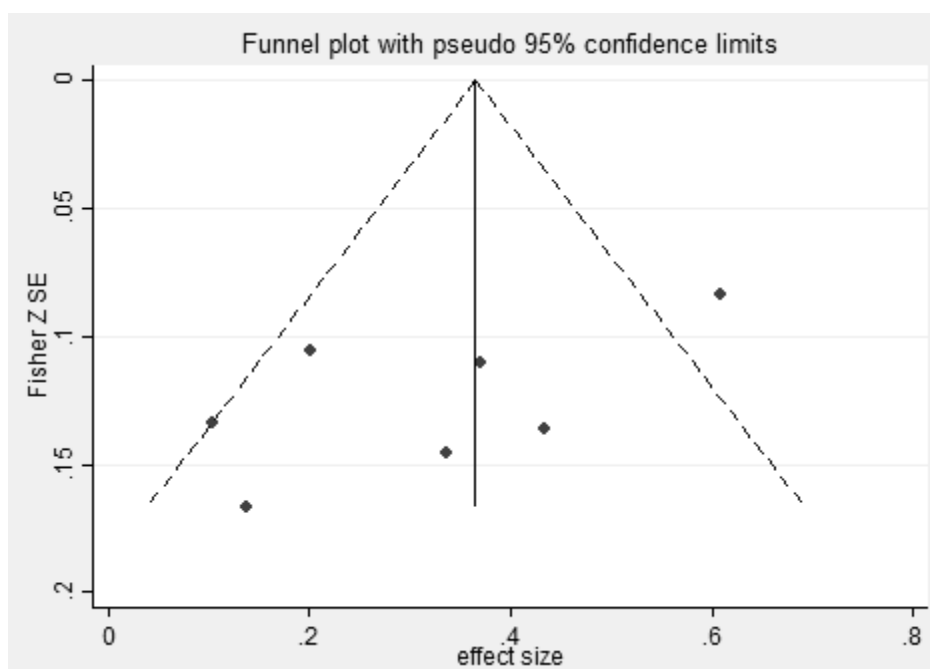


Figure 7. Funnel plot for meta-analysis comparing BPD and clinical control

Appendix 6: Meta-regression outcomes

Table 5. Table describing outcomes from univariate meta-regression

Meta-analysis Predictor	Correlation Coefficient (SE)	T value	95% CI	I ²
Main				
% females	.0057 (.0026)	2.22*	.0005; .0109	80.18%
Mean age	.0146 (.0058)	2.52*	.0029; .0264	78.33%
Quality	.0070 (.0328)	0.21 (n.s.)	-.0592; .0733	79.28%
RS measure				
RSQ vs. ARSQ	.0229 (.0757)	0.30 (n.s.)	-.1303; .1760	79.54%
Study design				
Correlation vs. case-control	.3398 (.0673)	5.05***	.2036 -.4759	69.85%
Population type				
Community vs. BPD	.0210 (.1263)	.17 (n.s.)	-.2350; .2769	66.33%
vs. mixed	.4399 (.0701)	6.28***	.2979; .5819	
vs. other clinical	.0860 (.1109)	0.78 (n.s.)	-.1386; .3107	
BPD vs. mixed	.4189 (.1394)	3.00**	.1364; .7014	
vs. other clinical	.0651 (.1638)	0.40 (n.s.)	-.2668; .3969	
Mixed vs. other clinical	-.3539 (.1256)	-2.82*	-.6083; -.0994	
Correlational				
% females	-.0000 (.0024)	-0.04 (n.s.)	-.0050; .0048	73.86%
Mean age	.0084 (.0049)	1.72 (n.s.)	-.0016; .0184	68.34%
Quality	-.0490 (.0251)	-1.95 (n.s.)	-.1004; .0024	64.98%
RS measure				69.28%
RSQ vs. ARSQ	.0242 (.0611)	0.40 (n.s.)	-.1008; .1493	
Population type				69.97%
Community vs. BPD	.0244 (.1278)	0.19 (n.s.)	-.2374; .2862	
vs. other clinical	.1526 (.1523)	1.00 (n.s.)	-.1595; .4646	
Case control (Healthy)				
% females	.0142 (.0058)	2.46*	.0013; .0270	69.5%
Mean age	.001 (.0223)	0.05 (n.s.)	-.0486; .0507	82.12%
Quality	.0343 (.0651)	.53 (n.s.)	-.1108; .1795	81.78%
RS measure				
RSQ vs. ARSQ	-.1518 (.1518)	-.96 (n.s.)	-.5052; .2017	80.9%
Population type				59.61%
Community vs. Mixed	.4797 (.1496)	3.21**	.1464; .8131	
Case control (Clinical)				
% females	-.0085 (.0055)	-1.54 (n.s.)	-.0228; .0057	49.18%
Mean age	-.0270 (.0199)	1.35 (n.s.)	-.0244; .0781	53.67%
Quality	-.0669 (.0470)	-1.42 (n.s.)	-.1878; .0540	56.54%
RS measure				
RSQ vs. ARSQ	-.2819 (.1517)	-1.86 (n.s.)	-.6720; .1081	49.78%

Note. All outcomes in bold are significant findings

I^2 = I –square statistic of heterogeneity; RS = Rejection Sensitivity; RSQ = Rejection Sensitivity Questionnaire; ARSQ = Adult Rejection Sensitivity Questionnaire; BPD = Borderline Personality Disorder; n.s. = non-significant. * $p < .05$; ** $p < .01$; *** $p < .001$